REMARKS

The present Amendment amends claims 1-16, and no claims are canceled or added. Therefore, the present application has pending claims 1-16.

Specification

The disclosure is objected to due to informalities noted by the Examiner. Where appropriate, Applicants have amended the specification to overcome this objection. Therefore, this objection should be withdrawn.

35 U.S.C. §103 Rejections

Claims 1-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U. S. Patent No. 6,014,694 to Aharoni et al. ("Aharoni") in view of U. S. Patent No. 6,898,241 to Vetro. This rejection is traversed for the following reasons. Applicants submit that the features of the present invention, as now more clearly recited in claims 1-16, are not taught or suggested by Aharoni or Vetro, whether taken individually or in combination with each other in the manner suggested by the Examiner. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection.

Amendments were made to the claims to more clearly describe features of the present invention. Specifically, amendments were made to the claims to more clearly recite that the present invention is directed to an encoding device and method as recited, for example, in independent claims 1, 2, 10 and 16.

Claims 1 and 16

The present invention, as recited in claim 1, and as similarly recited in claim 16, provides an encoding device, which is connected to an input terminal to which encoded image data is input, plural output terminals to which plural encoded image

data are output, and a parameter setting device that sets plural parameters for generating the plural encoded image data which are respectively output to the plural output terminals. The encoding device includes a storage unit that stores the plural parameters which are set by the parameter setting device. The encoding device also includes a decoder that generates non-encoded image data by decoding encoded image data which is input from the input terminal. Also included in the encoding device is a motion prediction processor which generates basic parameters from the plural parameters stored in the storage unit and performs motion prediction on the non-encoded image data by using the basic parameters. The encoding device further includes a memory that stores the result of the motion prediction for each of the plural parameters. According to the present invention, the result of the motion prediction is converted by each of the plural number of parameters, which are set with motion predictions obtained through the motion prediction processor. The encoding device further includes plural encoders which encode the non-encoded image data to generate compressed image data by using the plural parameters stored in the storage unit and the motion prediction result stored in the memory and output the compressed image data respectively to the plural output terminals. The prior art does not teach or suggest all of these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record. Specifically, the features are not taught or suggested by either Aharoni or Vetro, whether taken individually or in combination with each other.

Aharoni teaches a system for adaptive video/audio transport over a network. However, there is no teaching or suggestion in Aharoni of the encoding device and method as recited in claims 1 and 16 of the present invention.

Aharoni discloses a system for adaptively transporting video over networks, where the available bandwidth varies with time. The system includes a video/audio codec that functions to compress, code, decode and decompress video streams that are transmitted over networks having available bandwidths that vary with time and location. Depending on the channel bandwidth, the system adjusts the compression ratio to accommodate a plurality of bandwidths ranging from 20 Kbps for POTS to several Mbps for switched LAN and ATM environments. Bandwidth adjustability is provided by offering a trade off between video resolution, frame rate and individual frame quality. The system generates a video data stream comprised of Key, P and B frames from a raw source of video. Each frame type is further comprised of multiple levels of data representing varying degrees of quality. In addition, several video server platforms can be used in tandem to transmit video/audio information with each video server platform transmitting information for a single compression/resolution level.

One feature of the present invention, as recited in claim 1, and as similarly recited in claim 16, includes a memory that stores the result of the motion prediction for each of the plural parameters, where the result of the motion prediction is converted by each of the plural number of parameters, which are set with motion predictions obtained through the motion prediction processor. Aharoni does not disclose this feature, and the Examiner does not rely upon Aharoni for teaching a memory that stores the result of motion prediction.

Applicants agree that Aharoni does not teach a memory that stores the result of motion prediction, and further submit that Aharoni does not teach or suggest a memory that stores the result of the motion prediction for each of the plural parameters, where the result of the motion prediction is converted by each of the

plural number of parameters, which are set with motion predictions obtained through the motion prediction processor, as now more clearly recited in the claims.

Another feature of the present invention, as recited in claim 1, and as similarly recited in claim 16, includes plural encoders which encode the non-encoded image data to generate compressed image data by using the plural parameters stored in the storage unit and the motion prediction result stored in the memory and output the compressed image data respectively to the plural output terminals. Aharoni does not disclose this feature.

To support the assertion that Aharoni teaches this feature, the Examiner cites column 10, lines 50-65 and column 18, lines 43-65. However, neither the cited text nor any other portion of Aharoni teaches or suggests the claimed feature.

For example, Aharoni does not teach or suggest a plurality of encoders, in the manner claimed. As described in column 10, lines 50-65, Aharoni provides a description for Fig. 5, which is a diagram illustrating the five levels of video data that make up a key frame as stored in the file format of Aharoni. As described in column 18, lines 43-65, Aharoni describes the bandwidth control and measurement used in the multi-platform video server of Aharoni. Neither of these textual references or any other portion of Aharoni teaches or suggests the use of a plurality of encoders, in the manner claimed.

In the present invention, when producing compressed motion pictures having multiple conditions from one piece of motion picture, the basic parameters are obtained from the respective motion picture parameters, so as to obtain the motion vector based upon a basic or fundamental parameter thereof. Thereafter, each of the encoders conducts the motion prediction, using the motion vectors, which are converted in accordance with the motion picture parameters, respectively. In this

way, it is possible to make the compensation process for each of the encoders easy (i.e., common search of motion).

Unlike the present invention, Aharoni does not disclose conducting parallel encoding by means of a plurality of encoders. Aharoni merely discloses a technology for conducting hierarchical encoding upon a motion picture by a unit of frame thereof, thereby transmitting the compressed motion picture depending on the bandwidth of the network. This is quite different from the present invention.

Therefore, Aharoni fails to teach or suggest "a memory that stores the result of the motion prediction for each of the plural parameters, wherein the result of the motion prediction is converted by each of the plural number of parameters, which are set with motion predictions obtained through the motion prediction processor" as recited in claim 1, and as similarly recited in claim 16.

Furthermore, Aharoni fails to teach or suggest "plural encoders which encode the non-encoded image data to generate compressed image data by using the plural parameters stored in the storage unit and the motion prediction result stored in the memory and output the compressed image data respectively to the plural output terminals" as recited in claim 1, and as similarly recited in claim 16.

The above noted deficiencies of Aharoni are not supplied by any of the other references of record, namely Vetro, whether taken individually or in combination with each other. Therefore, combining the teachings of Aharoni and Vetro in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

Vetro teaches a video transcoder with up-sampling. However, there is no teaching or suggestion in Vetro of the encoding device or method as recited in claims 1 and 16 of the present invention.

Vetro discloses a method that up-samples a compressed bitstream. The compressed bitstream is partially decoding to produce macroblocks. Each macroblock has DCT coefficients according to a predetermined dimensionality of the macroblock. DCT filters are applied to the DCT coefficients of each macroblock to generate up-sampled macroblocks. For each macroblock, there is one up-sampled macroblock generated by each filter. Each generated up-sampled macroblock has the predetermined dimensionality.

One feature of the present invention, as recited in claim 1, and as similarly recited in claim 16, includes a memory that stores the result of the motion prediction for each of the plural parameters, where the result of the motion prediction is converted by each of the plural number of parameters, which are set with motion predictions obtained through the motion prediction processor. Vetro does not disclose this feature.

In the present invention, when producing compressed motion pictures having multiple conditions from one piece of motion picture, the basic parameters are obtained from the respective motion picture parameters, so as to obtain the motion vector based upon a basic or fundamental parameter thereof. Thereafter, each of the encoders conducts the motion prediction, using the motion vectors, which are converted in accordance with the motion picture parameters, respectively. In this way, it is possible to make the compensation process for each of the encoders easy (i.e., common search of motion). This is quite different from Vetro.

Unlike the present invention, Vetro merely discloses a technology for conducting the micro-block production and the motion vector conversion fitting to the trans-code condition, when conducting the trans-coding of a plurality of conditions, thereby conducting the motion picture trans-coding. This is not the same as the

present invention, where the result of the motion prediction is converted by each of the plural number of parameters, which are set with motion predictions obtained through the motion prediction processor.

Another feature of the present invention, as recited in claim 1, and as similarly recited in claim 16, includes plural encoders which encode the non-encoded image data to generate compressed image data by using the plural parameters stored in the storage unit and the motion prediction result stored in the memory and output the compressed image data respectively to the plural output terminals. Vetro does not disclose this feature, and the Examiner does not rely upon Vetro for teaching this feature.

Therefore, Vetro fails to teach or suggest "a memory that stores the result of the motion prediction for each of the plural parameters, wherein the result of the motion prediction is converted by each of the plural number of parameters, which are set with motion predictions obtained through the motion prediction processor" as recited in claim 1, and as similarly recited in claim 16.

Furthermore, Vetro fails to teach or suggest "plural encoders which encode the non-encoded image data to generate compressed image data by using the plural parameters stored in the storage unit and the motion prediction result stored in the memory and output the compressed image data respectively to the plural output terminals" as recited in claim 1, and as similarly recited in claim 16.

Claims 2-9

The present invention, as recited in claim 2, provides an encoding device which generates encoded data in plural formats. The encoding device includes an input terminal to which image data to be encoded is input, and plural encoders that

generate plural encoded image data in different formats, in accordance with each of the motion vectors of formats, respectively. The encoding device also includes an output terminal that outputs the plural encoded image data generated by the encoders. Furthermore, the encoding device includes an input unit that sets plural parameters which define each of the formats in which the image data is to be encoded by the encoders. Even further, the encoding device includes a processor that determines a set of basic parameters from the set plural parameters. The encoding device also includes a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit, and outputs the converted motion vectors which are to be used respectively by the plural encoders. The prior art does not teach or suggest all of these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record. Specifically, the features are not taught or suggested by either Aharoni or Vetro, whether taken individually or in combination with each other.

As previously discussed, Aharoni teaches a system for adaptive video/audio transport over a network. However, there is no teaching or suggestion in Aharoni of the encoding device as recited in claim 2 of the present invention.

One feature of the present invention, as recited in claim 2, includes plural encoders that generate plural encoded image data in different formats, in accordance with each of the motion vectors of formats, respectively. Aharoni does not disclose this feature.

To support the assertion that Aharoni teaches this feature, the Examiner cites column 10, lines 50-65 and column 18, lines 43-65. However, neither the cited text nor any other portion of Aharoni teaches or suggests the claimed feature.

For example, Aharoni does not teach or suggest a plurality of encoders, in the manner claimed. As described in column 10, lines 50-65, Aharoni provides a description for Fig. 5, which is a diagram illustrating the five levels of video data that make up a key frame as stored in the file format of Aharoni. As described in column 18, lines 43-65, Aharoni describes the bandwidth control and measurement used in the multi-platform video server of Aharoni. Neither of these textual references or any other portion of Aharoni teaches or suggests the use of a plurality of encoders, in the manner claimed.

In the present invention, when producing compressed motion pictures having multiple conditions from one piece of motion picture, the basic parameters are obtained from the respective motion picture parameters, so as to obtain the motion vector based upon a basic or fundamental parameter thereof. Thereafter, each of the encoders conducts the motion prediction, using the motion vectors, which are converted in accordance with the motion picture parameters, respectively. In this way, it is possible to make the compensation process for each of the encoders easy (i.e., common search of motion).

Unlike the present invention, Aharoni does not disclose conducting parallel encoding by means of a plurality of encoders. Aharoni merely discloses a technology for conducting hierarchical encoding upon a motion picture by a unit of frame thereof, thereby transmitting the compressed motion picture depending on the bandwidth of the network. This is quite different from the present invention.

Another feature of the present invention, as recited in claim 2, includes a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit, and outputs the converted motion vectors which are to be used respectively by the plural encoders. Aharoni does not disclose this feature, and the Examiner does not rely upon Aharoni for teaching this feature.

Therefore, Aharoni fails to teach or suggest "plural encoders that generate plural encoded image data in different formats, in accordance with each of the motion vectors of formats, respectively" as recited in claim 2.

Furthermore, Aharoni fails to teach or suggest "a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit, and outputs the converted motion vectors which are to be used respectively by the plural encoders" as recited in claim 2.

The above noted deficiencies of Aharoni are not supplied by any of the other references of record, namely Vetro, whether taken individually or in combination with each other. Therefore, combining the teachings of Aharoni and Vetro in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

As previously discussed, Vetro teaches a video transcoder with up-sampling. However, there is no teaching or suggestion in Vetro of the encoding device as recited in claim 2 of the present invention.

One feature of the present invention, as recited in claim 2, includes plural encoders that generate plural encoded image data in different formats, in accordance with each of the motion vectors of formats, respectively. Vetro does not

disclose this feature, and the Examiner does not rely upon Vetro for teaching this feature.

Another feature of the present invention, as recited in claim 2, includes a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit, and outputs the converted motion vectors which are to be used respectively by the plural encoders. Vetro does not disclose this feature.

To support the assertion that Vetro teaches this feature, the Examiner asserts that a transcoder (Fig. 7, item 701) for output to plural terminals (Fig. 7, item 702), uses a singular motion prediction processor that calculates a motion vector (column 10, lines 60-67 using a set of basic parameters (column 8, lines 50-60). The Examiner further cites column 9, lines 30-60 and column 4, lines 30-35 to support the assertion that Vetro teaches converting the motion vector according to the parameters and outputting the converted motion vectors. However, neither the cited text nor any other portion of Vetro teaches or suggests the claimed feature.

Unlike the present invention, Vetro merely discloses a technology for conducting the micro-block production and the motion vector conversion fitting to the trans-code condition, when conducting the trans-coding of a plurality of conditions, thereby conducting the motion picture trans-coding. This is not the same as the present invention.

In the present invention, when producing compressed motion pictures having multiple conditions from one piece of motion picture, the basic parameters are obtained from the respective motion picture parameters, so as to obtain the motion vector based upon a basic or fundamental parameter thereof. Thereafter, each of the encoders conducts the motion prediction, using the motion vectors, which are

converted in accordance with the motion picture parameters, respectively. In this way, it is possible to make the compensation process for each of the encoders easy (i.e., common search of motion). This is quite different from Vetro.

Therefore, Vetro fails to teach or suggest "plural encoders that generate plural encoded image data in different formats, in accordance with each of the motion vectors of formats, respectively" as recited in claim 2.

Furthermore, Vetro fails to teach or suggest "a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit, and outputs the converted motion vectors which are to be used respectively by the plural encoders" as recited in claim 2.

Claims 10-25

The present invention, as recited in claim 10, provides an encoding device which generates plural encoded data. The encoding device includes plural encoders to generate encoded image data in respectively different formats, in accordance with the motion vectors of formats, respectively. The encoding device also includes an output terminal to output the plural encoded image data generated by the encoders. Furthermore, the encoding device includes an input unit to set plural parameters which define each of the formats in which the image data is to be encoded by the encoders and to prioritize the plural parameters for each format. Further, the encoding device includes a processor to determine a set of basic parameters from the set plural parameters according to the prioritization. The encoding device also includes a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set

through the input unit and outputs the converted motion vectors which are to be used respectively by the plural encoders. The prior art does not teach or suggest all of these features.

The above described features of the present invention, as now more clearly recited in the claims, are not taught or suggested by any of the references of record. Specifically, the features are not taught or suggested by either Aharoni or Vetro, whether taken individually or in combination with each other.

As previously discussed, Aharoni teaches a system for adaptive video/audio transport over a network. However, there is no teaching or suggestion in Aharoni of the encoding device as recited in claim 10 of the present invention.

One feature of the present invention, as recited in claim 10, includes plural encoders to generate encoded image data in respectively different formats, in accordance with the motion vectors of formats, respectively. Aharoni does not disclose this feature.

To support the assertion that Aharoni teaches this feature, the Examiner cites column 10, lines 50-65 and column 18, lines 43-65. However, neither the cited text nor any other portion of Aharoni teaches or suggests the claimed feature.

For example, Aharoni does not teach or suggest a plurality of encoders, in the manner claimed. As described in column 10, lines 50-65, Aharoni provides a description for Fig. 5, which is a diagram illustrating the five levels of video data that make up a key frame as stored in the file format of Aharoni. As described in column 18, lines 43-65, Aharoni describes the bandwidth control and measurement used in the multi-platform video server of Aharoni. Neither of these textual references or any other portion of Aharoni teaches or suggests the use of a plurality of encoders, in the manner claimed.

In the present invention, when producing compressed motion pictures having multiple conditions from one piece of motion picture, the basic parameters are obtained from the respective motion picture parameters, so as to obtain the motion vector based upon a basic or fundamental parameter thereof. Thereafter, each of the encoders conducts the motion prediction, using the motion vectors, which are converted in accordance with the motion picture parameters, respectively. In this way, it is possible to make the compensation process for each of the encoders easy (i.e., common search of motion).

Unlike the present invention, Aharoni does not disclose conducting parallel encoding by means of a plurality of encoders. Aharoni merely discloses a technology for conducting hierarchical encoding upon a motion picture by a unit of frame thereof, thereby transmitting the compressed motion picture depending on the bandwidth of the network. This is quite different from the present invention.

Another feature of the present invention, as recited in claim 10, includes a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit and outputs the converted motion vectors which are to be used respectively by the plural encoders. Aharoni does not disclose this feature, and the Examiner does not rely upon Aharoni for teaching this feature.

Therefore, Aharoni fails to teach or suggest "plural encoders to generate encoded image data in respectively different formats, in accordance with the motion vectors of formats, respectively" as recited in claim 10.

Furthermore, Aharoni fails to teach or suggest "a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit and outputs the

<u>converted motion vectors which are to be used respectively by the plural encoders</u>" as recited in claim 10.

The above noted deficiencies of Aharoni are not supplied by any of the other references of record, namely Vetro, whether taken individually or in combination with each other. Therefore, combining the teachings of Aharoni and Vetro in the manner suggested by the Examiner still fails to teach or suggest the features of the present invention as now more clearly recited in the claims.

As previously discussed, Vetro teaches a video transcoder with up-sampling. However, there is no teaching or suggestion in Vetro of the encoding device as recited in claim 10 of the present invention.

One feature of the present invention, as recited in claim 10, includes plural encoders to generate encoded image data in respectively different formats, in accordance with the motion vectors of formats, respectively. Vetro does not disclose this feature, and the Examiner does not rely upon Vetro for teaching this feature.

Another feature of the present invention, as recited in claim 10, includes a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit and outputs the converted motion vectors which are to be used respectively by the plural encoders. Vetro does not disclose this feature.

To support the assertion that Vetro teaches this feature, the Examiner asserts that a transcoder (Fig. 7, item 701) for output to plural terminals (Fig. 7, item 702), uses a singular motion prediction processor that calculates a motion vector (column 10, lines 60-67 using a set of basic parameters (column 8, lines 50-60). The Examiner further cites column 9, lines 30-60 and column 4, lines 30-35 to support the assertion that Vetro teaches converting the motion vector according to the

parameters and outputting the converted motion vectors. However, neither the cited text nor any other portion of Vetro teaches or suggests the claimed feature.

Unlike the present invention, Vetro merely discloses a technology for conducting the micro-block production and the motion vector conversion fitting to the trans-code condition, when conducting the trans-coding of a plurality of conditions, thereby conducting the motion picture trans-coding. This is not the same as the present invention.

In the present invention, when producing compressed motion pictures having multiple conditions from one piece of motion picture, the basic parameters are obtained from the respective motion picture parameters, so as to obtain the motion vector based upon a basic or fundamental parameter thereof. Thereafter, each of the encoders conducts the motion prediction, using the motion vectors, which are converted in accordance with the motion picture parameters, respectively. In this way, it is possible to make the compensation process for each of the encoders easy (i.e., common search of motion). This is quite different from Vetro.

Therefore, Vetro fails to teach or suggest "plural encoders to generate encoded image data in respectively different formats, in accordance with the motion vectors of formats, respectively" as recited in claim 10.

Furthermore, Vetro fails to teach or suggest "a motion prediction processor which calculates a motion vector by using the set of basic parameters, converts the motion vector according to the parameters set through the input unit and outputs the converted motion vectors which are to be used respectively by the plural encoders" as recited in claim 10.

Both Aharoni and Vetro suffer from the same deficiencies, relative to the features of the present invention, as recited in the claims. Therefore, combining the

teachings of Aharoni and Vetro in the manner suggested by the Examiner does not render obvious the features of the present invention as now more clearly recited in the claims. Accordingly, reconsideration and withdrawal of the 35 U.S.C. §103(a) rejection of claims 1-16 as being unpatentable over Aharoni in view of Vetro are respectfully requested.

The remaining references of record have been studied. Applicants submit that they do not supply any of the deficiencies noted above with respect to the references used in the rejection of claims 1-16.

In view of the foregoing amendments and remarks, Applicants submit that claims 1-16 are in condition for allowance. Accordingly, early allowance of claims 1-16 is respectfully requested.

To the extent necessary, the applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, or credit any overpayment of fees, to the deposit account of MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C., Deposit Account No. 50-1417 (referencing Attorney Docket No. 520.43319X00).

Respectfully submitted,

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